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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/718,116

11/20/2003

Norihiro Dejima

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7590

08/12/2004

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EXAMINER

DUPUIS, DEREK L

ART UNIT

PAPER NUMBER

2883

DATE MAILED: 08/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/718,116

Applicant(s)

DEJIMA ET AL.

Examiner

Derek L Dupuis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 7, 9 and 11-16 is/are rejected.
- 7) ☒ Claim(s) 1, 3, 5 and 8-12 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: ____.

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper."

Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

2. Figures 13-16 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities: line 14 of page 42 states that "the optical path lengths of the optical paths "IN"- "OUT", "ADD"- "OUT", and "IN"- "DROP" are set to be equal to each other" as demonstrated in Table 6

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on pages 42 and 43. However, the last design case in the left column demonstrates that the three optical path lengths are in fact not equal. Appropriate correction is required.

Claim Objections

4. Claim 1 is objected to because of the following informalities: “plural optical fibers” in line 2 of claim 1 should apparently be “at least three or more optical fibers” because the claim involves three different fibers referred to as a “first optical fiber” (line 5), a “second optical fiber” (line 6), and a “third optical fiber” (line 9).

5. Claim 3 is objected to because of the following informalities: “both of the optical path” in line 2 of claim 3 should apparently be “both of the optical paths”. Appropriate correction is required.

6. Claims 9 and 10 are objected to because of the following informalities: “each of said movable mirror and said fixing mirror” in line 2 of claim 9 and line 2 of claim 10 should apparently be “each of said movable mirrors and said fixing mirrors”. Appropriate correction is required.

7. Claims 11 and 12 are objected to because of the following informalities: “said movable mirror is formed at a size three times or less” is unclear because the term “size” does not designate which dimension of the mirror is being referred to. “Size” could refer to diameter, radius, width, height, thickness, etc. Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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9. Claims 1, 2, 8, and 11-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. Claims 1, 2, and 16 recite the limitation "said optical fibers" in lines 13 and 14 of claim 1, line 10 of claim 2, and line 4 of claim 16. There is insufficient antecedent basis for this limitation in the claim. It is suggested that the limitation be reworded to read "said plural optical fibers".

11. Claim 2 recites the limitation "the beam emitted from a fourth optical fiber" in lines 4 and 8. There is insufficient antecedent basis for this limitation in the claim.

12. Claim 8 recites the limitation "said optical path" in line 7 of claim 8. There is insufficient antecedent basis for this limitation in the claim. It is unclear which optical path the limitation is referring to.

13. Claims 11 and 12 recite the limitation "said movable mirror" in lines 4 and 5 of claim 11 and lines 4 and 5 of claim 12. There is insufficient antecedent basis for this limitation in the claim. While claim 9 refers to "each of said movable mirrors", the limitation cited in claims 11 and 12 does not specify to which mirror it is referring.

14. Claims 11 and 12 recite the limitation "the beam diameter" in lines 5 and 6 of claim 11 and lines 5 and 6 of claim 12. There is insufficient antecedent basis for this limitation in the claim. While the beam may have proper antecedent basis in the claims, the diameter of the beam does not.

15. Claim 13 recites the limitation "the optical axis" in line 3. There is insufficient antecedent basis for this limitation in the claim.

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16. Claims 13-15 recite the limitation "said optical fiber" in line 3 of claim 13, line 3 of claim 14, and lines 2 and 3 of claim 15. There is insufficient antecedent basis for this limitation in the claim. While the "plural optical fibers" may have antecedent basis in claim 1, it is unclear to which optical fiber the limitation is referring.

17. Claim 15 recites the limitation "the light amount" in line 2. There is insufficient antecedent basis for this limitation in the claim.

18. Claim 16 recites the limitation "the optical axes" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

19. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

20. A person shall be entitled to a patent unless –

~~-(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent;~~

DLD
8/19/04

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

21. Claims 1-3, 7, 13 and 16 are rejected under 35 U.S.C. 102(~~a~~ and e) as being anticipated by *Mills et al. (PN 6,650,804)*.

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22. With regard to claim 1, Mills et al. discloses an optical switch with plural optical fibers arranged in parallel with one another as shown in figure 3 of Mills et al. The switch has fixing mirrors (40d and 40c) located in front of the fibers which result in the beam from a first optical fiber (38-4) being guided into a second optical fiber (38-3). The

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switch also has a movable mirror (42e) that can be advanced or retreated from in front of the optical fibers. This movable mirror, when advanced in front of the fibers, guides the beam from the first optical fiber to a third optical fiber. The path length of the path formed by the beam from the first optical fiber to the second optical fiber is equal to the path length formed by the beam from the first optical fiber to the third optical fiber.

Upon inspection of figure 3, it can be seen that the intervals at which the optical fibers are spaced do not have to be equal. In fact, only the distances between 38-4 and 38-3 and between 38-2 and 38-1 must be equal for the path lengths described above to be equal. The interval between 38-3 and 38-2 must be equal to the horizontal distance between the mirrors which does not have to be equal to the interval between 38-4 and 38-3 and between 38-2 and 38-1.

23. With regard to claim 2, Mills et al. teach an optical switch as discussed above in reference to claim 1. The switch has a fixing mirror (40a) in front of the fibers to guide a beam emitted from a fourth optical fiber (38-1) to a third optical fiber (38-2). The switch also has a movable mirror (42b) that, when advanced in front of the fibers, guides the beam from the fourth optical fiber (38-1) to the second optical fiber (38-3).

24. With regard to claim 3, Mills et al. teach an optical switch as discussed above in reference to claim 2. Figure 3 shows that the path length between the first optical fiber (38-4) and the second optical fiber (38-3), as created by the fixed mirrors (40d and 40c), is equal to the path length between the first optical fiber (38-4) and the third optical fiber (38-2), as created with the movable mirror (42e), which is also equal to the path length between the fourth optical fiber (38-1) and the third optical fiber (38-2), as created with the fixed mirror (40a), which is also equal to the path length between the fourth optical

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fiber (38-1) and the second optical fiber (38-3), as created with the movable mirror (42b).

In summary, all four path lengths are equal.

25. With regard to claim 7, Mills et al. teach an optical switch as discussed above in reference to claim 3. Figure 3 shows a total of 4 fixing mirrors and a total of 5 movable mirrors which are simultaneously movable so as to be advanced and retreated in front of the optical fibers.

26. With regard to claim 13, Mills et al. teach an optical switch as discussed above in reference to claim 1. The mirrors shown in figure 3 are at 45 degree angles with respect to the optical axis of the optical fibers (see column 1, lines 62-67 of Mills et al.).

27. With regard to claim 16, Mills et al. teach an optical switch as discussed above in reference to claim 1. Figure 5 of Mills et al. shows an optical switch device comprising plural optical switches as described above in reference to claim 1. The optical axes are parallel to one another on a face on which the optical fibers are parallel to each other.

Claim Rejections - 35 USC § 103

28. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a)

~~(b)~~ A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

29. ^{Claims 4 and 6 are} ~~Claim 4 is~~ rejected under 35 U.S.C. 103(a) as being unpatentable over *Mills et al.* (PN 6,650,804) as applied to claims 1-3 above, and further in view of *Hill* (PN 6,542,656).

30. With regard to claim 4, Mills et al. teaches an optical switch as discussed above in reference to claim 3. Mills et al. does not teach that the optical switch is used in the optical communication of an add-drop system where the first optical fiber is set to IN and one of either the second or third optical fiber is set to OUT, and the other is set to DROP, and where the fourth optical fiber is set to ADD. Figure 3A of Hill teaches an optical switch used in the optical communication of an add-drop system with a first optical fiber set to IN, a second optical fiber set to OUT, a third optical fiber set to DROP, and a fourth optical fiber set to ADD. It would have been obvious to one of ordinary skill in the art at the time of invention to use the optical switch of Mills et al. in the optical communication of an add-drop system as taught by Hill for the purpose of creating a “high performance add-drop optical switch” (column 2, lines 42-44 of Hill).

31. With regard to claim 6, Mills et al. teaches an optical switch with modifications taught by Hill as applied to claim 4 above. Mills does not teach that the optical path from the fourth optical fiber, set to ADD, to the second or third optical fiber, set to DROP, is interrupted. Hill teaches an optical switch as shown in figure 3A of Hill where the optical path from a fourth optical fiber set to ADD (340) to a second or third optical fiber set to DROP (350) is interrupted on the way. It would have been obvious to one of ordinary skill in the art to modify the switch as taught by Mills to have the optical path from ADD to DROP interrupted as taught by Hill for the purpose of minimizing components needed for the switch to operate since it is known in the art that the beam from DROP to ADD is “only a nuisance to be absorbed if necessary” (see Tomlinson, column 6, lines 33-34).

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32. Claims 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Mills et al. (PN 6,650,804)* as applied to claim 7 above, and further in view of *Lin et al. (PN 6,317,532)*.

33. With regard to claim 9, Mills teaches an optical switch as discussed above in reference to claim 7. Mills does not teach that the movable and fixing mirrors can each only reflect one beam. Lin teaches the use of mirrors in an optical switch that are large enough to only reflect one beam. It would have been obvious to one of ordinary skill in the art at the time of invention to use the mirrors that can only reflect one beam as taught by Lin in the optical switch of Mills for the purpose of using smaller mirrors rather than using “larger mirrors [that are] impractical for the size” (see column 5, lines 15-17 of Lin) of the switch thus resulting in the switch being small and compact.

34. With regard to claim 11, Mills et al. in combination with Lin teach an optical switch as described above in reference to claim 9. Mills also teaches that the switch has a number of movable and fixed mirrors needed to create the optical paths described above in reference to the parent claims. Mills does not teach that the movable mirrors are formed at a size of three times or less the beam diameter. Lin teaches a mirror used in an optical switch with a diameter equal to 1 times the size of the beam diameter (see column 4, lines 60-66 of Lin). It would have been obvious to one of ordinary skill in the art at the time of invention to use the optical fiber as taught by Mills in combination with the mirrors with a diameter of 1 times the size of the beam diameter as taught by Lin for the purpose of “reducing the loss associated with beam divergence” (see column 4, lines 60-63 of Lin).

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35. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Mills et al.* (PN 6,650,804) as applied to claim 1 above, and further in view of *Jing* (PN 6,259,835).

36. With regard to claim 14, Mills teaches an optical switch as discussed above in reference to claim 1. Mills does not teach the use of a lens, arranged between the optical fibers and the mirrors, for converging a beam propagated within an optical fiber or for changing the beam to parallel light. Jing teaches “a plurality of lenses ... provided adjacent to the terminations of the input and output optical fibers to collimate light on the respective optical paths” (column 3, lines 5-7 of Jing). It would have been obvious to one of ordinary skill in the art at the time of invention to place the lenses at the terminations of the input and output optical fibers (as taught by Jing) of the optical switch taught by Mills for the purpose of collimating the light traveling between the optical ports because “light transmitted from an optical fiber termination tends to disperse as it travels into free space beyond the termination” (see column 5, lines 8-12 of Jing).

Allowable Subject Matter

37. Claims 5 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

38. The following is a statement of reasons for the indication of allowable subject matter: Claim 5 is allowable over the prior art of record because the latter, either alone or in combination, does not disclose nor render obvious an optical switch as taught in claim 4 wherein only the optical path from a fourth optical fiber set to ADD to a second or third optical fiber set to DROP is different in length from the other optical paths, in

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combination with the rest of the claimed limitations. Claim 10 is allowable over the prior art of record because the latter, either alone or in combination, does not disclose nor render obvious an optical switch as taught in claim 8 wherein each of the movable mirrors and fixing mirrors can reflect only one beam, in combination with the rest of the claimed limitations.

39. Claims 8, 12, and 15 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

40. The following is a statement of reasons for the indication of allowable subject matter: Claim 8 is allowable over the prior art of record because the latter, either alone or in combination, does not disclose nor render obvious an optical switch as taught in claim 3 with at least four fixing mirrors in total and with two movable mirrors in total that are simultaneously movable so as to be advanced and retreated in front of a set of plural optical fibers so as to construct a series of optical paths as discussed in the parent claims, in combination with the rest of the claimed limitations. Claim 12 is allowable over the prior art of record because the latter, either alone or in combination, does not disclose nor render obvious an optical switch as taught in claim 10 with a number of fixed and movable mirrors needed to construct the optical paths taught in the parent claim wherein each of the movable mirrors are at a size three times or less the beam diameter, in combination with the rest of the claimed limitations. Claim 15 is allowable over the prior art of record because the latter, either alone or in combination, does not disclose nor render obvious an optical switch as taught in claim 1 wherein the light amount for coupling a beam emitted from an optical fiber can be adjusted by controlling the

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advancing amount and the retreating amount of the movable mirrors with respect to the optical path, in combination with the rest of the claimed limitations.

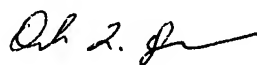
Conclusion

41. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. ***Tomlinson (PN 5,960,133)*** teaches an optical switch usable as a wavelength division add/drop multiplexer. Tomlinson teaches the basics of an add-drop switch and is referred to by Hill.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derek L Dupuis whose telephone number is (571) 272-3101. The examiner can normally be reached on Monday - Friday 8:30am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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